

separate than those formed in the reaction with hydrochloric acid. Indeed, chloracetic acid boils at about  $186^{\circ}$ , and benzoyl chloride at  $198^{\circ}$ : in the experiments of M. Loir, the latter compound seems to have distilled over first, leaving the chloracetic acid in the retort. At temperatures near  $150^{\circ}$ , the products of this reaction are acetyl chloride, chloracetic acid, benzoyl chloride and chlorobenzoic acid; at lower temperatures, the principal products are acetyl chloride and chlorobenzoic acid.

From his experiments, M. Loir considers that there is a difference in constitution between benzoyl acetate and acetyl benzoate, but the results of these experiments being erroneous, such a conclusion is unsustainable. These bodies thus named are identical; all of their reactions *under the same conditions* are the same, and they must be represented by the same rational formula.

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*Stated Meeting April 2, 1880.*

Present, 12 members.

Mr. Fraley, Prof. P. E. Chase, Dr. R. E. Rogers, Mr. J. S. Price, Dr. Cresson, and Mr. Phillips signified by letter their acceptance of the appointment to represent the Society at Boston on the 26th of May.

Dr. Genth declined the appointment to prepare a notice of the late Prof. Roepper, on the score of ill-health.

A letter of envoy was received from the U. S. Naval Observatory in Washington.

A letter requesting contributions to the burnt library at St. John, New Brunswick, was received from Mr. Jas. Denville, Honorary Secretary, House of Commons, Canada, dated Ottawa, March 11, 1880.

Donations for the library were received from the Academies at Rome, Berlin, Brussels, and Philadelphia; the Geographical Society at Bordeaux; the Victoria Institute, R. Astronomical Society, and London Nature; the Societies at Quebec and Milwaukee; the Boston Natural History Society; Cambridge Museum C. Z., and New England Genealogical Society; the Observatories at Washington and Mexico; the University and Peabody Institute at Baltimore; Mr. J. S. Price, and Mr. Henry Phillips, Jr.

The death of Guillaume Philippe Schimper, at Paris,

March 29, aged 72, was announced by the Secretary; and on motion, Prof. Leo Lesquereaux of Columbus, O., was appointed to prepare an obituary notice of the deceased.

A short communication "On the origin of planets" was received from Prof. Daniel Kirkwood.

Pending nominations Nos. 893 to 908 and new nominations Nos. 909 to 913 were read.

On motion of Mr. J. S. Price, based upon a letter from Dr. Cattell of Easton, the use of the Hall of the Society was tendered to the American Philological Association for its next annual meeting in July.

And the meeting was adjourned.

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*On the Origin of Planets. By Daniel Kirkwood.*

(Read before the American Philosophical Society, April 2, 1880.)

If Laplace's hypothesis of the formation of planets and satellites from nebulous *rings* cannot be sustained\* we may conclude that each planet, at its origin, was separated from a very limited arc of the equatorial protuberance; or, in other words, that instead of the separation of a ring, the centrifugal force produced a rupture at the point of least resistance in the equatorial belt. From the chasm thus formed a nebulous mass was thrown out, which in process of time was transformed into the outermost planet.† The tendency to separation around the equator would thus be relieved, and the ellipticity of the spheroid temporarily diminished. Further condensation, however, would again increase the centrifugal force until another rupture or outrush similar to the first would necessarily result. The formation of planets from these nebulous masses may thus be explained without the necessity of supposing such matter to have been slowly collected from continuous rings.

The origin of satellites is also very obviously accounted for. In short, where the ring hypothesis is encumbered with difficulties well nigh insuperable, the theory here proposed seems less open to objection. Not improbably, however, the ancient orbits of the secondary systems and perhaps also of some of the primary planets may have differed to a considerable extent from their present dimensions, as is shown by Mr. G. H. Darwin in his "Tidal Theory of the Evolution of Satellites."‡

\* Proc. Amer. Phil. Soc., vol. xviii., p. 324.

† It is now believed by astronomers that the phenomena of temporary stars, such as those of 1572, 1866 and 1877, are produced by enormous outbursts of incandescent matter.

‡ The Observatory for July, 1879.